NOVEMBER 1955

Approach

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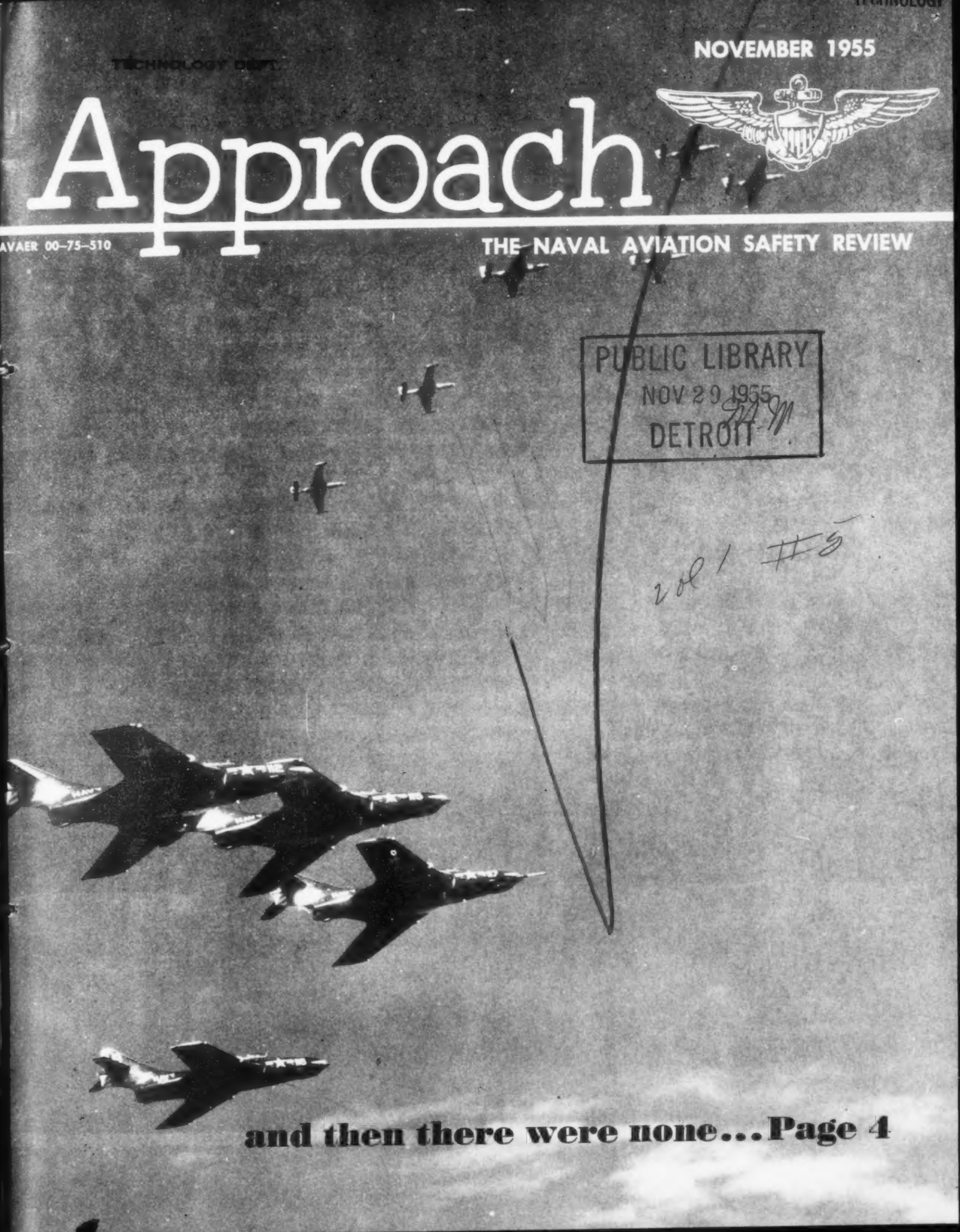
THE NAVAL AVIATION SAFETY REVIEW



and then there were none... Page 4

Approach

THE NAVAL AVIATION SAFETY REVIEW

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Sound flight planning includes more than route, range and weather. The best planners in the business also make provisions for emergencies—rather than trust to luck, or snap judgment. For what happened on one flight, see "and then there were none . . ." page 4.

NOVEMBER 1955

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editorial

LTGEN C. F. Schilt

Assistant Commandant of the Marine Corps (Air)

The invitation to address you through the medium of this issue of the "Approach," The Naval Aviation Safety Review, comes as a welcome opportunity.

The problems of aviation accident prevention in the Marine Corps are inherently little different from those in Naval aviation as a whole, with a few possible exceptions. These exceptions are primarily associated with personnel.

With the ending of the conflict in Korea, a new problem presented itself. The input of new Naval Aviators into the Marine Corps had reached considerable proportions. Concurrently, large numbers of experienced Marine Corps Reserve aviators were returned to inactive duty. In addition to many inexperienced new aviators joining Marine squadrons, the squadrons were losing many of their older, more qualified pilots. Coupled with a continuing changeover from propeller-driven to jet aircraft, the result was a noticeable increase in the aircraft accident rate, with its attendant increases in personnel injuries, aircraft damages, and monetary losses. It was imperative that an all-out aviation safety program be launched and vigorously supported to halt the upward trend in accidents.

The Marine aviation accident data for Fiscal Years 1954 and 1955 reveals a significant decrease in the accident rate for 1955, as compared to that for 1954, notwithstanding a considerable increase in the number of hours flown during 1955. This reversal in the accident trend is attributed directly to hard work and application to the task of accident prevention at all echelons. Increased safety consciousness, greater general effort toward accident prevention, improved techniques in accident analysis, and constructive action taken to help prevent accidents of a recurring type, have all paid great dividends in reduction of the accident rate.

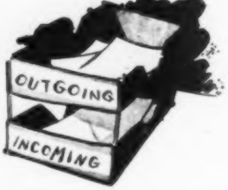
I wish to commend those whose efforts have lowered the accident rate, and enjoin all hands to continue the good work. There still remains room for improvement in all phases of accident prevention. The problem is ever-present, with continuing introductions of newer, faster, and more complicated types of aircraft to the Fleet, together with the new techniques, armament, and equipment that accompany them. Regardless of the extent of the problem, I am confident that it can and will be met.

C. F. Schilt

C. F. SCHILT

Excerpts from the minutes of recent aviation safety council meetings . . .

Safety Council Notes



NATTC—The air operations committee reported that NAS Memphis has replaced the paddles used by the runway signalman with an Aldis lamp equipped with red and green filters. It was stated that the light is more effective in attracting the pilots attention at greater distance and height.

CHERRY POINT—The combined safety council of the Second Marine Aircraft Wing, MCAS and Training Group 20, discussed the accidents caused by collision with tow banners and targets. It pointed out that damage suffered in collision with present lightweight tow equipment will become more severe when higher speed targets come into use.

COMFLOGWINGLANT/CONTINENTAL—It was recommended that pilots be periodically advised of their responsibility to ensure that each occupant of an aircraft has an adequate ditching station. In certain model aircraft, viz, the P4Y-2, ditching platforms must be rigged before takeoff.

CNAVANTRA—Several instances of aircraft accidents caused by blown tires due to debris on the runway were cited. The inability of magnetic sweepers to pick up non-magnetic materials was brought up. NAS Memphis reported a practice of two runway inspections a day; before 0800 and after 1630.

COMFAIRJAX—Surprise inspections over a five-week period showed a definite laxity in cross-country planning and supervision. The senior member of the safety council reiterated the warning given by ComFAirJax that a reduced accident rate should serve as a danger sign against relaxed flying habits.

HELICOPTER UTILITY SQUADRON ONE—Two instances were cited wherein helicopter crashes resulted in unnecessary injury because pilots and crewmen failed to wear hardhats. Personnel should be advised to remain well clear of helicopters landing and taking off because of the wide radius of shrapnel whenever rotor blades strike the ground or when other parts are thrown loose.

Does your flight planning include provisions for emergencies, which might prevent the completion of your mission? Such things do happen, and did in "and then there were none . . ." beginning on the next page.

Flight Operations

Again, the Naval Aviation Safety Center has obtained a factual account of a flight situation of such impact as to warrant special treatment. And again, as in the presentation of the "Man With the Banjo" *(Aviation Safety Bulletin No. 20-54)* the report is offered without editorial comment and with only a brief introduction.

--and then there were none...

IT was a "routine" flight by members of a reserve squadron — eight pilots were scheduled; seven got airborne; five continued the flight to its unscheduled conclusion; one pilot died.

Concerning the five pilots, it is believed that their individual experience and backgrounds provide a fairly typical cross-section of reserve aviation. The list, which might well be repeated in any of a hundred similar activities, includes a manager of an electrical supply firm, the director of industrial relations for an oil refinery, a member of a construction company, an associate of a farmers' cooperative supply organization, and the director of a local chamber of commerce.

Married, family men almost without exception, these pilots drive or are flown to their base once each month to engage in three or four flights and to log an average of about 10 flight hours per month.

This is their story.

EIGHT reserve pilots were scheduled for a VFR cross-country navigation flight to provide cruise control training in F9F-7s prior to engaging in forthcoming maneuvers. Originally projected several months before, the flight received final approval and pilots were designated about 1030 one Saturday morning.

Because of the relatively short notice on which the flight was finally undertaken, the squadron found it necessary to obtain two replacement

It began as a routine cross-country. En route these five pilots encountered unexpected weather. Faced with this emergency and others, each handled the situation differently. Here's a blow by blow account.

pilots from a local companion squadron. One of the replacements was designated flight leader because he had the necessary instrument qualification required for such flights.

Of the eight pilots scheduled, three had flown a hop previously during the day; only four had made cross-country flights in the F9F-7. As finally organized, the flight appeared something like this:

Number 1: (flight leader) received checkout in F9F-7 two months before and had logged 10.7 hours in model.

Number 2: Checked out in model a year previously and had about 60 hours in model.

Number 3: Checked out in model previous year and had about 30 hours in model.

Number 4: Checked out in model a year before; had about 29 hours in model.

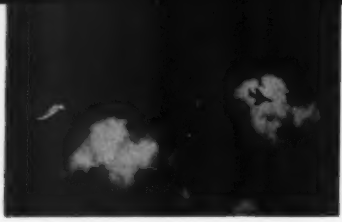
Number 5: Checked out about two months before and had approximately 20 hours in model.

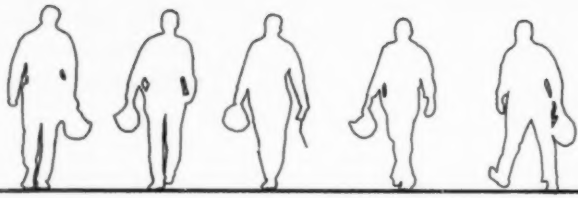
Number 6: Checked out a year before; had 20 hours in model.

Number 7: Checked out about three months before; had about five hours in model.

Number 8: Checked out a year before; had some 40 hours in model.

Distance of the flight was 555 miles over a route which approached mountainous terrain near the destination. Weather briefing noted a tornado well to the southwest of the route and scattered thunderstorms predicted en route.





and then there were none . . .
(Continued)

Time en route was one hour 30 minutes, with the flight to arrive over destination with an estimated 1840 pounds of fuel remaining.

Preflight planning was accomplished with most of the pilots working out their own flight plans, and with the flight leader completing a briefing "as thorough as any flight I ever briefed."

Starting, departure from the line and preliminary radio check was according to normal procedure. One aircraft was delayed on starting and was left at the line. Radio communications check proved difficult, with considerable shifting of frequency required to establish a common tactical channel.

On reaching the head of the runway there was an initial delay of several minutes while a number of aircraft landed. Takeoff was at 1705. Joinup after takeoff was quickly accomplished and the leader then circled the field at a low altitude to check the status of the delayed aircraft, which failed to leave the line. Flight members figured that some 800 pounds of fuel had been expended during delays.

Then There Were *Seven*

Departure and climb to 36,000 feet on a northwest course was uneventful, but approximately 110 miles out on course the No. 5 and No. 6 men returned to base after reporting excessive fuel consumption. No. 7 then moved up into the No. 5 position astern.

Then There Were *Five*

About 200 miles on course the flight encountered the first thunderstorm, an anvil head at about 32,000-34,000 feet, which they were able to drop under without difficulty. Thereafter several small thunderheads were flown over. Weather to the north and east of course appeared relatively clear.

About 250 miles out the canopy of No. 5, formerly No. 7, began icing over despite constant use of manual control, and in a short time he was looking out "through a dollar-sized hole." In a few minutes, however, the icing abruptly disappeared.

A radio check netted the report that destination weather was a comfortable 15,000 feet, scattered, with thunderstorms to the southeast.

Noting what appeared to be a sizable thunderstorm ahead, the flight began climbing to top it. At this time No. 5 began to lag behind. When the flight had attained 38,000-40,000 feet, and was nearing the thunderstorm, the flight leader advised he was reducing power to 87 percent to allow No. 5 to catch up. No. 5 gave a count for a DF steer from the planes ahead, which he could no longer see. On reduction of power by the leader, Nos. 3 and 4 overran and used their excess speed to pull up slightly higher than the rest of the flight.

Now No. 3 called in that he was encountering stall in his airplane and No. 5 noted the same condition. At this time a pilot, possibly No. 3, suggested reversal of course, but No. 4, higher than the others, reported he could see over the top of the thunderstorm.

Just short of the thunderstorm the leader began a left turn which immediately aggravated the stall of the aircraft. Mushing considerably, the flight entered the cloud, No. 2 entering first, followed by No. 1, No. 4 held course and altitude. No. 3's actions from this point are not known, but possibly he elected to go down through the clouds. No. 5 attempted a 180 but stalled through the tops of the thunderhead at about 39,000 feet.

From this point, the integrity of the flight disappeared as each of the remaining pilots found himself in a situation requiring a separate solution. The account of how

each pilot attempted to solve his individual problem follows.

Lose Leader

Completing his turn away from the cloud and circling in the clear at about 34,000-36,000, No. 1 began calling the flight, but was unable to establish satisfactory communications. He then began a descent in the trough paralleling the near side of the cloud, throttle at idle, and leveled at 17,000 feet to go around the edge of the thunderhead and to resume base course.

It was then apparent that the 1500 pounds of fuel remaining would be insufficient to make destination, and No. 1 began looking for a place to land. Following a highway he descended to 5000 feet to select a stretch on which to set down. After dragging the road for obstructions he made an approach over a pickup truck and touched down, blowing a tire as brakes were applied. On landing runout he noted a slight hill over which he might expect to see a car come at any time, so he turned off the highway at a side road intersection to clear. A car immediately came over the hill to investigate the low flying airplane.

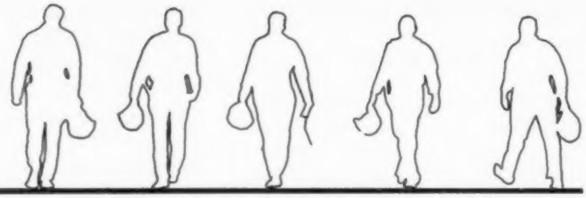
Driven into a nearby town the pilot obtained the services of a tractor and a hired hand to tow the plane into town. This was accomplished after a few mishaps involved in being towed off the pavement onto the soft shoulder.

Thereafter No. 1 was advised of the crash of another aircraft some 40 miles away and was driven to the scene to assist in its identification.

Then There Were *Four*

On entering the cloud, No. 2 elected to descend through what he assumed to be only a layer, to bust out under, and remain contact to go on to destination. He extended speed brakes, reduced throttle and

"About 200 miles on course the flight encountered the first thunderstorm, an anvil head at [illegible],000 feet."



and then there were none . . . (Continued)

began a 5000-6000 fpm rate of descent, holding base course. The descent was considerably prolonged. He first encountered lightning and then severe turbulence, and meanwhile he attempted to hold a nose-down attitude to prevent stalling.

After the first period of turbulence No. 2 became concerned about his altitude with reference to surrounding terrain, believing that below 15,000 feet he would be dangerously near to the mountains ahead. He turned north, and got into more violent turbulence, lost control of the airplane a couple of times and at 15,000 feet decided to eject. Still in turbulence, still in a dive, he jettisoned his canopy (he lost his helmet but does not recall when this occurred), and releasing the controls, pulled the curtain. Nothing happened, but he had been told that he might reasonably expect a two or three-second delay in the firing of the seat, so he was not particularly upset over the delay.

Curtain over his chin, he waited—then decided to peek around the curtain to see if he were still in the airplane. He was. He released the curtain, waited, still diving, considered re-safetying the curtain, discarded the idea and went back to driving the airplane.

While considering his next move he saw the ground materializing below to show that he still had a safe altitude. Breaking out beneath the clouds at about 5500 feet he retracted speed brakes and took up an easterly heading, unable to get much speed because of the absence of the canopy. After searching for a time for a place to land, he selected a stretch of highway near a town. He was down to 500 pounds of fuel now. Checking the wind from the local trash dump he made an approach over an automobile at about 150 feet, leveled at 10 feet, cut the throttle and landed. Slowing to taxi, he folded the wings to cross a bridge and continued into town where he turned off to park on a side street.

After his report was made, arrangements were made for a nearby air station to send a crew with another canopy, fuel, a starter unit, and to disarm the hot seat. Faced with the problem of what to do with the seat cartridge, the pilot considered throwing it into a lake, burying it, and then obtained a shotgun from a patrolman and shot the side of the shell open, rupturing it so the powder could be removed. The shell case was turned over to investigating personnel for further check.

When the airplane was ready for flight, it was pushed by local citizens back to the highway, which was blocked off. A clear stretch of road about a mile in length was then available before the highway crossed a low bridge. Thereafter, another mile of open highway was usable. There was no fuel in the wing tanks; elevation of the "field" was 2200 feet.

The airplane was almost airborne at the first bridge, and in accordance with his preplanning, the pilot was able to lift the plane up on the oleos to clear the bridge safely. Thereafter he was airborne on the second stretch of "runway."

"After I got off," said the pilot, "I came back and made a pass by the town to do a roll of appreciation for their help."

Then There Were *Three*

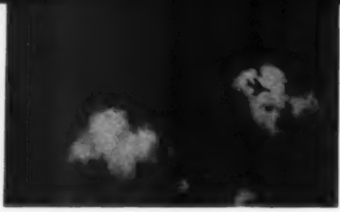
Because No. 3 was not observed from the time the flight entered the top of the cloud, nor were any radio transmissions heard, his actions may only be guessed. The airplane crashed some 40 miles away from the point at which No. 1 landed. The plane hit in a near-vertical angle on the corner of a cement foundation of a farm structure, digging a large hole and being demolished by the impact.

"Arrangements were made with a nearby air station for repairs."

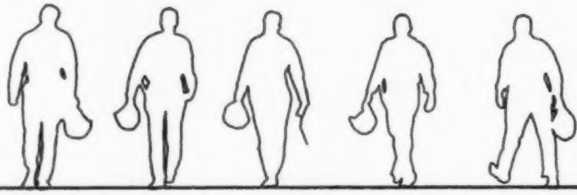
"When the airplane was again ready for flight . . ."

". . . it was pushed to the highway by local citizens."

As the aircraft took off down the highway everyone in town came out to take pictures of the unusual event.



and then there were none . . . (Continued)



After the initial inspection the investigating party concluded that the ejection seat was not in the wreckage. Shortly thereafter, because of the inconvenience caused the property owner by the crowds of spectators and souvenir hunters attracted to the scene, it was decided to bulldoze the wreckage into the hole and to cover it up. The pilot was later found, dead of injuries which possibly resulted from hitting some part of the plane on bailout. Questions then raised concerning the absence of the ejection seat prompted the re-opening of the crash hole to re-examine the wreckage. Parts of the ejection seat were then found in the wreckage.

Then There Were *Two*

The No. 4 man stated that from his position 1000-2000 feet above the rest of the flight, he could see over the top of the cloud, and recommended going over.

However, when the leader reduced power to allow No. 5 to catch up, No. 4 encountered stall and began to lose altitude. He increased power to 100 percent but still lost some 1000 feet more. A tentative turn with the rest of the flight increased the stall and he returned to base course and was in the cloud. He too, thought he would be able to penetrate quickly.

Within the cloud, he reports that his fuel consumption appeared to have increased, and he decided to get down in order to have some fuel remaining for landing. At this time he had about 1500 pounds. Knowing that a range of mountains was directly ahead on course he turned to parallel the mountains and continued his descent at about 4000 fpm. He too encountered vio-

"Number 4 man elected to attempt a landing on this dam."

lent turbulence but the airplane handled very well and he never lost control. He attempted to raise CAA and Navy towers without success and then called "Mayday." His only answer was from an Air Force B-25 which gave him some idea of weather conditions beyond the storm area.

At 15,000 feet he heard No. 2 call he was in the clear. At 12,000 feet the fuel warning light came on (he had not retarded throttle during his descent). At 11,000 feet he broke out beneath the thunderstorm and turned to intercept base course. After attempting to locate himself by landmarks and down to 700 pounds of fuel remaining he circled a reservoir with the intention of a water ditching.

Noting the length of the reservoir dam, about 9300 feet, and its width, some 25 feet, he elected to try and land on the dam itself. To one side, the water level was about 15 feet below the top of the dam. On the other side was a drop of about 250 feet. A guard rail, about three feet high ran along either edge of the dam.

On touchdown, he avoided use of brakes and, flaps clattering on the tops of the guardrail pipes, completed the rollout and added power to taxi off the far end of the dam. Taxiing down to some buildings he was met by an irate reclamation official who advised him that "Son, you're in *trouble!* You can't go landing on government property like this!"

Shortly thereafter, arrangements were made to report the landing and for the removal of the airplane.

"number 4's disabled airplane starts the long slow trek home."

Then There Was *One*

At the time the formation approached the cloud, No. 5 was at about 39,000 feet at about 170 knots, stalling through the tops of the clouds. On trying to make a 180, he stalled and mushed into the clouds. Attempting to fly out of the clouds on instruments, he also hit violent turbulence, being flipped on his back and getting into other unusual attitudes.

At times he was gaining 6000 fpm and at other times he was descending 4000 fpm. He came out below the clouds at 17,000 feet in a slight nose-down turn, but a low airspeed brought on a stall. He nosed over to pick up speed and lost altitude down to 6000 feet. He then climbed back to 15,000, having about 1900 pounds of fuel left.

Taking up an easterly course away from the storm area he was unable to establish his position, and spotting an abandoned airstrip, with only 700 pounds of fuel indicated, he elected to land. The strip was about 5800 feet long, and landing was without incident. No. 5 then "took a chance and started walking." He was later informed that he was quite fortunate in his choice of direction, for had he taken the opposite direction he would have found no houses, just a long stretch of open country.

He found a house and was able to report his landing and arrange for fuel to be brought to the airstrip. Then, he reports, "I got my biggest shock when I saw a spectator smoking near the airplane as it was being fueled!" The plane was returned to base.

— *And Then There Were None.* ●

The Aviation Safety Center is indebted to the pilots who voluntarily provided this candid account for the benefit of other pilots.

Truth and Consequences

A DIGEST OF RECENT AIRCRAFT ACCIDENTS

The AJ's barrier engagement was successful, but that's all she wrote!

VA

AJ

LOW BLOW—At the 45-degree position the AJ-2 appeared slightly low but the LSO continued a Roger. Close to the ramp the pilot dipped his nose slightly and was given a cut which was early.

The tailhook struck the ramp and sheared. After bouncing the aircraft made a second touchdown at the 528-foot mark and the pilot applied his brakes at the same time.

The aircraft skidded into the barriers engaging numbers 3 and 5 with the main gear. There were no personnel injuries but the aircraft sustained strike damage.

It was noted in the accident report that in two previous AJ accidents successful barrier engagements had been made with brakes applied just prior to engagement. Stopping the main wheels appears to preclude the throwing-off action of the barrier cable.

The accident board concluded that the primary cause of the accident was the combination of a low approach from the 45-degree position and the pilot's error in dropping the nose in the groove. Major contributing factors were the failure of the LSO to correct the low position.

AD

AND ONE WAS TOO MANY— An AD-6 making dive-bombing runs from 20,000 to 13,000 failed to pull out of its dive and crashed near the target. A portion of the pilot's parachute was seen to leave the plane at a low altitude. Immediately afterwards the pilot left the airplane, but was separated from the main part of the chute, and received fatal injuries. The cause of the pilot's inability to pull out of the dive in normal fashion was unknown.

Unfortunately, this account does not end here. Another member of the bombing flight, observing the crash, descended immediately and, with gear down began circling the scene. After changing from a right-hand orbit to a left turn, the plane's altitude became so low as to cause the crash vehicle to fire a warning flare. Apparently intent upon his task of directing the crash crew, the pilot ignored the warning. Shortly thereafter he was seen to retract his gear, whereupon the airplane commenced a roll to the left and crashed, killing the pilot.

Conclusions and recommendations of the aircraft accident board included the following:

1. Pilot error . . . flying dangerously low and slow in steep turns.

2. . . . stall/spin from which no recovery was possible due to excessively low altitude.

3. . . . pilot remained at the scene longer than was necessary.

4. . . . pilots review frequently the stall warnings and spin characteristics for their respective airplanes.

5. . . . utmost caution at scene of accidents, with special emphasis on basic rules of flight.

6. . . . when rescue crews arrive on the scene of an accident, assisting aircraft return to a safe altitude to await further instructions.

To these comments can only be added: "Forgetting fundamentals is fatal in flying."

While observing a crash scene, the pilot neglected speed and altitude.

AD

DROP THAT HOT POTATO! —Landing an AD aboard a carrier with a full 150-gallon external tank attached to the starboard inboard wing rack resulted in considerable structural damage to the aircraft.

Making a normal approach and upon taking the cut from the LSO the right wing dropped 20 degrees. The pilot took corrective action by applying left aileron and rudder without results. The aircraft contacted the deck in a pronounced left skid. The tailwheel broke as a result of the lateral motion when it struck the deck. The flight deck crew hoisted the tail section onto a dolly and upon being towed forward the starboard main gear started to collapse. Investigation showed the scissors brace to be broken, a damaged main starboard landing gear and broken structural members in the starboard wheelwell.

The AAR Board concluded the primary cause of the accident was pilot error. A contributing factor was the non-symmetrical, right wing-heavy loading of 990 pounds. The board recommended that when aircraft must land aboard with unbalanced loads, airspeed should be increased in proportion to the amount of unbalance. The aircraft must be landed straight ahead after the cut with no attempt at major alignment corrections. No attempts should be made to land aboard with fuel in an external tank except in an emergency.

A reviewing authority added: In addition to the ever-present control problems encountered when landing with non-symmetrical load the fire hazard dictates the jettisoning of external fuel prior to recovery.

The runway signalman waved and waved but nobody was at home.

VF

F9F

WHEELS-UP SIGNALS—"I was flying an F9F-6 on a familiarization hop which was to include five touch-and-go landings at the end of the period. Weather conditions were ceiling unlimited and visibility about eight miles with a slight haze.

"I made my first two touch-and-gos without mishap. After this, I again made a right turn out, circled wide to the left and re-entered the pattern a third time from the west at 1000 feet. I raised my gear and flaps upon becoming airborne after each landing.

"After my third entry to the pattern with speed brakes down I raised the speed brakes, thought I placed the gear handle in the DOWN position, and lowered the landing flaps. The gear was in fact not down. I made a normal approach and landed at about 100 knots. I did not note any signal from the wheels watch. I noted no flares from the wheels watch nor red lights from the tower."

During his approach the pilot reported gear down for touch-and-go. The aircraft was over the approach end of the runway before the tower observed the no-wheels condition and a warning to wave-off was given too late to be effective.

Runway Signalman's Report: "When he was back in the pattern I noticed that he didn't have his wheels down. I waited until he was approaching the runway and I started waving him off. Just before he got to me I heard his engine rev up. I thought he was taking off again. Then he went past me and I noticed he was dropping to land. I got the flare gun and started to fire, but he was too far down the runway to see it if I had fired it."

The accident board recommended that the runway signalman fire a Very's pistol signal immediately upon discovering an aircraft in the landing approach with wheels up. This procedure was felt appropriate in respect to jet aircraft due to the greatly increased closing speed and slow rate of acceleration.

It was recommended that if tower operators are unable to observe the landing gear by the use of binoculars, they should be instructed to observe the runway signalman if possible. This is to ascertain whether a wave-off signal is given, in which case the tower should warn the pilot by radio.

(Editor's Note: One air station's answer to this problem of wheels-up warnings was described in the April 1955 *Naval Aviation Safety Bulletin.*)

Days between landings on a big CV
Were just a paltry forty-three
Not surprising should it be
LSO said "D for D"
(Aircraft damage coded "B")
Moral should be plain to see

FJ

OBEY OR PAY—Experiencing an engine seizure and flame-out on his first familiarization flight in an FJ-3, the pilot was repeatedly told by his chase pilot to eject. However upon reaching 7000 feet the pilot declared his intention to fly the aircraft to a landing.

The chase pilot followed the aircraft down and while orbiting at 2000 feet saw it crash and burn in an open field. The FJ-3 contacted the ground in a landing attitude with flaps down, speed brakes in and gear trailing. Ten feet after contact, it struck a mound of dirt. From this point on, for about 160 feet, parts of the aircraft were scattered.

Prior to the fatal accident, the pilot had 95 hours of jet flight and had completed the FJ-3 ground syllabus. It was considered by the accident board that pilot technique had little or no connection with the cause of the engine malfunction. There was no doubt that the pilot should have ejected rather than attempt an emergency landing.

In cases of engine seizure in an FJ-3, which results in generator and primary flight control system failures, the emergency flight control system operates on battery power only. In such a situation, since battery power will be available for an indeterminate and limited period of time, ejection, if altitude permits, is the safest action to take.

The AAR endorsement noted that pilots in the squadron were instructed concerning the purpose and responsibility of the chase pilot during the first six familiarization flights. The chase pilot is especially picked for his ability and is completely checked out in the aircraft. The new pilot should follow the instructions and orders of the chase pilot just as he would those of the LSO.

Not obeying the chase pilot's instructions cost this FJ-3 pilot his life.

Precautionary landing resulted in a record successful sea taxi.

VP

P5M

SAIL HO!—Thirty-six minutes after takeoff the port engine of a P5M failed. At the time the aircraft was at high gross weight and had 2000 feet of altitude.

With the weight involved single-engine flight was impossible without lightening the load. The bomb-bay tanks were full and represented 7000 pounds of easily jettisonable weight. However, bomb-bay tanks were hard to obtain so the pilot elected to retain the tanks and land. The water was calm and sheltered and an uneventful landing was made.

After landing the crew prepared to taxi back to their base 80 miles away. Underway watches were organized and hydro flaps were adjusted to steer the aircraft on a straight course. The big "boat" completed the nine-hour trip without damage and at an average speed of nine knots.

When commenting on the event, the commanding officer of the squadron felt that the differences in each situation would prevent useful suggestions for other P5M pilots. In this particular instance the pilot had good sheltered water on which to land and taxi back to his base.

NAS

SNB

FUEL STARVATION—While on a practice instrument landing approach both engines on an SNB-5 failed without warning. The aircraft was at 500 feet altitude and a glide was set up for a nearby clearing in a wooded area. Attempts to get the engines going again resulted in only a momentary increase in power and the plane was landed wheels-up in the clearing. Correct use of safety equipment prevented injury to personnel though the aircraft sustained strike damage.

From a thorough examination of the engines and associated fuel components there was no evidence of mechanical irregularity. It was concluded by the accident board that the accident was due to fuel starvation which would result from: (a) setting the fuel selector valve *between* the

Suddenly finding himself with no fans at all, the pilot headed for a clearing.

right main and the right auxiliary tank; as the latter tank was exhausted, air was drawn into the fuel lines, (b) fuel selector being on right auxiliary tank, a dry tank, (c) failure to complete the check-off list by leaving the mixture control in the lean position.

It was recommended that all pilots review their own fuel management habits, the objective being a fresh approach to make sure that their routine has not become a mechanical, automatic process.

HU

HUP

CHECK WIND—Following a successful practice autorotation from 500 feet the pilot of a HUP-2 began the same maneuver from 1000 feet. There was no windsock at the practice field and the wind had shifted from the northwest to northeast at eight knots.

The autorotation was executed on an approximate heading of west and by turning slightly left during the maneuver, the aircraft was headed downwind. A passenger occupying the copilot's seat noted that the rotor RPM was around 270, or below the red line about a quarter width of the RPM needle.

Believing he would overshoot his intended touchdown point, the pilot began a steep flare. Investigation indicated that the rotor blades stalled and lacking sufficient altitude with which to recover, the aircraft crashed.

It struck the ground in a 30-degree tail-low attitude with an impact angle of 45 degrees. After dropping on the main gear the HUP-2 rocked up on the nose and then fell back on the main gear and tail. During this time the engine cover fasteners sheared and the cover flew up causing destruction of the rotor system. The engine remained running and the passenger cut the magneto switch.

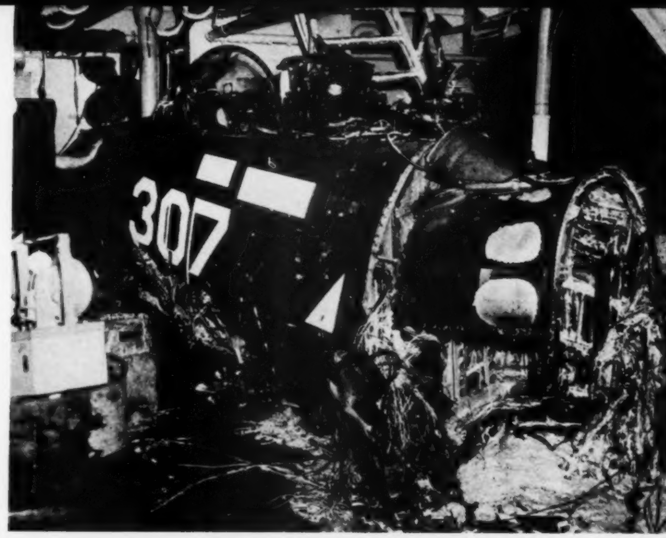
As evidenced by the accompanying photograph, the aircraft sustained strike damage. The pilot received fatal injuries and the passenger was seriously injured.

In its analysis of the crash the accident board was of the opinion that the pilot did not check the wind prior to entering the maneuver and was unaware of the windshift. The board's recommendations included the practice of providing a windsock at any site used for practice autorotations and excluding passengers from flights where such maneuvers are to be practiced. ●

The surface wind shift was un-noticed.

AMAZING STORY—For the dubious reader who desires additional proof of the effectiveness of the safety equipment provided by the Navy....

Tremendous fireball illuminates the flight deck just after the low and slow F2H plowed into the carrier's spud locker.



. . . And the F2H pilot actually walked away!

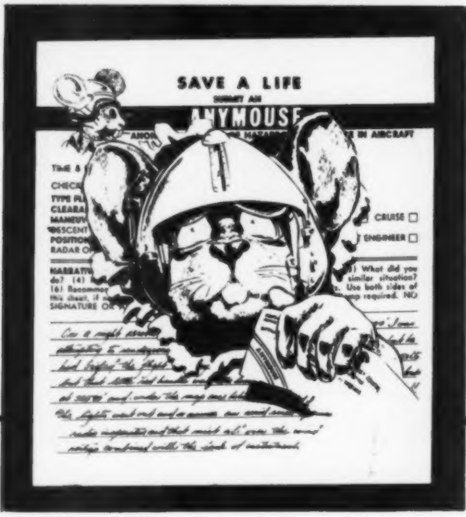
IT FINALLY HAPPENED

"HE nearly put one into the spud locker!" is a traditional comment of naval aviation which refers to a low carrier pass that puts the plane in danger of hitting the stern of the ship. The odds against successful accomplishment of this feat are astronomical, and there have been no reports of pilots surviving a trip through the fantail. But there's always a first time....

Following a night flight, the pilot of an F2H-3 began a carrier approach which was normal until he neared the groove. At this time the LSO observed an uncorrected rate of descent which necessitated a wave-off. Although the pilot added power, the plane did not respond in time to clear.

The airplane crashed into the starboard side of the fantail, just below the ramp, and exploded on impact, but the right wing and aft fuselage broke away and fell into the sea, carrying the fire away.

The pilot was able to scramble, unassisted, from the cockpit section which was wedged in the fantail. He sustained no serious injuries. The effective use of shoulder harness, safety belt, protective helmet and oxygen mask undoubtedly enabled the pilot to survive this most unusual accident.



Anymouse

and his hairy tales

WEATHER MISSING

On a VFR cross-country which was near the maximum range of his F2H, Anymouse was carefully checking fuel consumption. On takeoff, weather at his destination was 3000 scattered with 15 miles visibility and was forecast to remain the same. Checking weather with one-third of the flight to go, Anymouse was informed that the sequence report for his destination was not available.

A fuel check indicated 800 pounds would remain at destination. "A little short," said Anymouse, "but I considered it adequate."

"About 30 minutes east of my destination I ran into a solid cloud deck extending from about 1500 feet up to 12,000 feet with some buildups going to 25,000 feet.

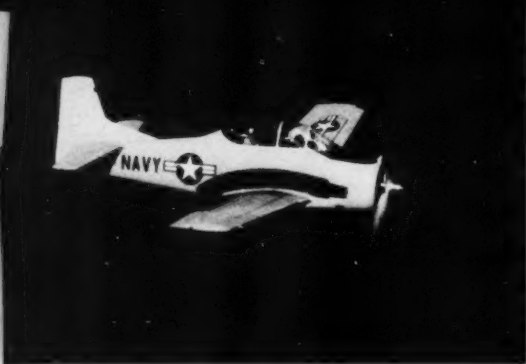
"I was not instrument qualified in jets and couldn't continue IFR on top and didn't believe I had enough fuel to turn back and reach an air station previously passed. I let down to get beneath the overcast, shutting down one engine to conserve fuel during the letdown. Of course this ran my fuel consumption up so that my reserve began to look pretty insignificant. I made it with 71 gallons remaining. I advise against continuing a maximum range flight if weather information is missing from your destination."

WORLD'S MOST GENTLE TURN

"Shortly after takeoff in an F9F-6 I noticed a definite tendency of the port wing to drop as I raised the landing gear," said Anymouse. "The same thing occurred when the flaps were raised. By this time the airplane was quite unstable laterally, and very definitely left wing-heavy. I suspected a flaperon failure, and looked back at the port wing to check wing trimmer position and flaperon operation.

"To my utter horror I saw that the port wing was unlocked. The warning flag was up, and the wing outer panel was flapping gently, but generally holding a position about 10 degrees above its normally spread position. At this time I was at 1000 feet and directly over a small town. Since the port wing was holding its position, and because of my position and altitude, I decided not to eject. I reduced power, and started the world's most gentle turn back toward the field. Hydraulic pressure alone was holding that port wing down, so I actuated the emergency hydraulic pump to help out.

"I lowered the gear normally because I didn't want to use speed brakes or reduce RPM to slow down enough to use the air bottle. The port wing raised a few inches more as the gear came down, and again held steady. I made a fast, no-flap approach and



"There were no words of praise from the instructor . . ."

"Shortly after takeoff I noticed a definite tendency of the port wing to drop as I raised the landing gear."

landing, touching down at 160 knots. Once on deck, I dropped flaps and speed brakes, and braked to a stop.

"Postflight investigation revealed the following:

"1. The wing-lock control had previously been forced, deforming the linkage to the locking cam. This allowed the wing-lock control to be lowered without actuating the locking cams. The warning flag linkage was not affected by this action, and still provided adequate warning indication.

"2. The port wingfold cylinder was improperly adjusted, and did not allow the wing to reach the fully spread position, thus mechanically preventing the wing locking pin from going home. The wing did spread far enough to actuate the sequence valve and direct pressure to the locking pin however.

"3. My preflight inspection revealed that the warning flags were up, but after turnup I checked only the wingfold and locking controls, which were in the spread and locked position. At this time I neglected to inspect the wing warning flags.

"Regardless of the mechanical condition of the wingfold system, this incident could have been avoided had I made a complete check of the wing locking system. Haste almost made waste."

OUT COLD

A student Anymouse working a range orientation in the rear seat of a T-28 on a hot, humid day, became worried by a 30-minute silence from the front cockpit. After crossing and recrossing the high cone three times there were no hearty words of praise, no cussing, no nothing from his instructor.

Popping the hood Anymouse discovered his instructor "out cold" and it required repeated calls on the intercom plus calls on UHF from another plane to rouse him. The instructor then took over and flew the aircraft back to base.

The flight surgeon's investigation disclosed the following facts: (a) the instructor had not been exposed to hypoxia or carbon monoxide poisoning and he was not suffering from any illness or physical defect, (b) during the preceding 24 hours he had eaten only one sandwich and had had three mixed drinks and four beers, (c) that he had only four or five hours sleep the night before.

WHY DON'T THEY?

If you've an idea you'd like to see developed in the *Approach*, just jot it down on an Anymouse form and send it in. Anymouse will see that your report is considered, and an answer prepared for publication when the material is of a general nature.

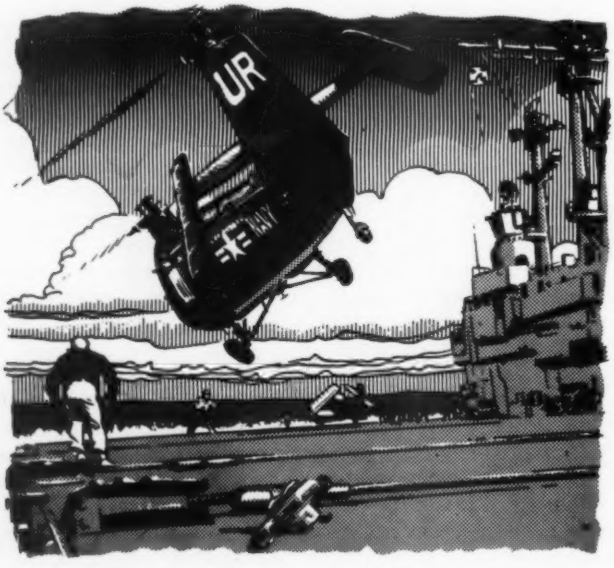
A pair of paper clips can show you how to get more helicopter engine life, so learn now to

Spare the horses!

OLD-TIME helicopter pilots have long been aware of the wisdom of obtaining optimum reliability and durability from engines whose rated power leaves something to be desired. Because the sage advice of the collected experience of these old-timers is a proven value, the relatively inexperienced pilot will do well to take note of some of the tricks of the trade which might prevent a dunking and save the taxpayers' money.

First, it is pointed out, the R975 is rated high for its displacement. For example, the R-1340 is rated at 600 hp at takeoff, and 550 for continuous power. The ratio of normal rated power to displacement is 550: 1340. While the horsepower ratings are the same for the R-975 engine, the ratio of NRP to displacement is a hefty 550: 975. This means that high output is required of the engine to give the necessary performance.

Secondly, this power differential, being so much less than is available to other aircraft, imposes on the helicopter pilot a special burden of careful engine operation which is not such a critical requirement to other aircraft.



Don't stand the aircraft on its nose and pull high power accelerating out unless the situation demands that you've really got to go.

A simple demonstration with a pair of paper clips will serve to illustrate the basic principle of this problem of engine life. First, straighten a clip. Hold one end firmly and move the other through an arc of 60 degrees. Note that after a given number of cyclics the wire breaks. Now take the other paper clip and perform the same operation, except to move the free end through an arc of only *five* degrees. Don't miss lunch and dinner waiting for the clip to break. For practical purposes, much the same effect is produced in engines which are subjected to constant, excessive power demands.

The power taken from an engine is a function of the weight of the aircraft, its speed, rate of climb and rate of acceleration. So, if you are interested in becoming an old-timer:

A. Don't climb out faster than is necessary.

B. Don't operate the aircraft any heavier than is necessary. (Fuel up only for the duration of the hop plus a calculated reserve)

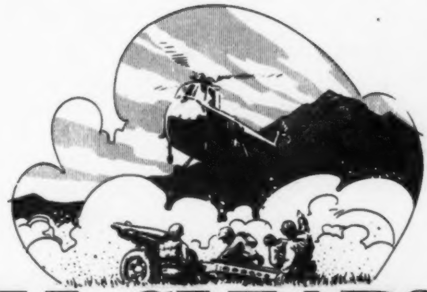
C. Don't, if you're going cross-country, take five or six riders or any unnecessary load.

D. Don't stand the aircraft on its nose and pull high power in accelerating out unless you've really got to go.

E. Don't work the engine any harder than is necessary.

F. Do fly at reasonable powers when cruising around, and your accident rate should stay at a minimum, and your maintenance personnel will vote you Pilot of the Year! ●

Unprepared and semi-permanent helicopter landing areas increase the pilot's landing problems.



Is that landing area ALL CLEAR?

DAMAGED rotor blades caused an emergency landing during a normal landing attempt to HUP-2 recently in an area which was marked by strips of cloth held down by stones. Damages were caused by the rotor blades striking a portion of the cloth marking during the final phase of the landing.

This accident points up the need for the dissemination of information regarding the use of semi-permanent helicopter landing areas. Ships and other activities that normally request helicopter services can assist in minimizing the occurence of this type accident if they are aware of matters peculiar to helicopter operations.

A review of the recommendations of the aircraft accident board and doctrine of Helicopter Squadron Two presents the following operational procedures:

At best, helicopter landings in unprepared areas are hazardous and should be planned and carried out with the utmost caution due in the main to the ever-present possibility of blade damage from debris striking the rotors. With the exception of fragile rotors, helicopters are designed for, and certainly their intended use is for, operations out of small and unconventional landing areas.

Accidents of this type have not been uncommon and increased education at the squadron level on correct procedures for landing at unprepared sites is an immediate responsibility of command. When a helicopter is required to land at an area other than an airport, all pilots should circle the point of intended landing at a safe altitude above the ground but sufficiently low to permit detection of obstacles, debris or loose gear prior to actual landing. Whenever necessary, squadron doctrine should also require that the crewmember be let out of the plane from a hover and after inspecting the terrain direct the pilot to a landing.

Field markings for a landing site for heliport of semi-permanent nature should be outlined by a large circle in lines or white paint with arrows indicating the best approach lanes. This circle should be at least 40 feet in diameter and should also identify the location by name. A landing area marked in this manner would be especially appropriate at service hospitals, ground forces, encampments and embassies. ●

O N a DVFR cross-country flight two F7U-3s encountered thunderstorms along course, attempted unsuccessfully to climb over, and entered the clouds well below the tops. Shortly after penetration, the two aircraft became separated. The wingman was able to land at an alternate field; the leader's airplane crashed, killing the pilot.

The report of the investigation noted that a thorough discussion of the operational limitations of the F7U-3 is contained in the Supplemental Flight Handbook and in Technical Order 23-54. As is true for other high performance aircraft, these sources specify that at high altitudes, under certain weight conditions, and when encountering turbulence, the maximum airspeed permitted is reduced. Also, the operational flight diagram for such airplanes show that at high altitudes at low IAS, the maximum G which may be accepted prior to limit buffet is severely limited and little margin is left for possible overcontrol or turbulence.

In such a situation, the pilot finds himself operating in a critically limited area of his Vn/Vg envelope, where to push over would subject the airplane to the effects of compressibility and aero-elasticity. At the same time, to pull up would put him into a stall, with attendant spin gyrations. (See "Out of Bounds" and "Something's Gotta Give," in July and September issues of the *Approach*.)

In its thunderstorm flight procedure section, the handbook states that "most severe turbulence is apt to be encountered at 14,000 to 16,000 feet, with minimum turbulence likely at about 6000 feet, or in the 'anvil top' of the storm." Obviously the lower region of non-turbulence is usually unavailable to jet aircraft.

Therefore, the pilot should be aware that in such a situation, should he seek the higher region of reduced turbulence *without* reference to the limitations imposed on his aircraft with respect to speed and G, he might easily exceed the capabilities of his airplane.

For example should he elect to climb to a relatively high (30,000-40,000 feet) altitude in order to penetrate the reduced turbulence of the anvilhead, the pilot must remember that there still may remain a "minimum" amount of turbulence in the anvil head. If the margin of safety of the airplane has been reduced to say, one-half G, only a small jolt can impose an excessive stress on the airplane.

In short, the pilot may inadvertently push himself into the coffin corner of his Vn/Vg envelope with serious results.

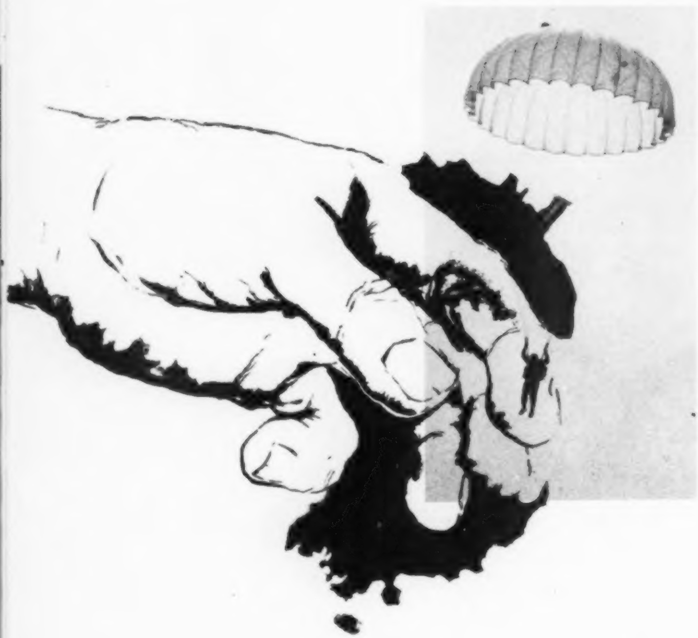
Answer: Know the capabilities of your airplane, and *plan accordingly!*

He knew his Pilot's Handbook, but not well enough to realize that he flew into the

Coffin Corner

Having a parachute and knowing how to get out of the aircraft are just part of the survival picture. Do you know how to land with the silk shape? Check "The Soft Touch", next page . . .

Aero-Medical →



Extend arms up and hold the lift webs . . .

The Soft Touch

After getting out of your aircraft, don't sit back and relax—there's still more to be done. Landing with the soft touch requires considerable attention to minor details.

Proper parachute landing techniques are important during all seasons of the year, but are especially important during the winter season when the winds are high and the weather frigid.

Different surfaces require different techniques and high winds may complicate your landing, as in the following example. An instructor and his student had ejected from a disabled jet over a cactus-covered area.

The wind in this case was 25 to 30 knots and the student landed in a running position. Since he was unable to run at 25 knots he was jerked flat and dragged about 150 feet before he could spill his chute. His high-cut shoes were penetrated by cactus thorns and his gloves were torn.

land with knees slightly bent, feet apart . . .

relax like a rag doll, not a wooden soldier!

The instructor made out fine as he was prepared to apply the correct landing technique, such as the following.

Face into the direction of your drift. Fewer landing injuries are sustained when the chutist lands this way. The method used in turning yourself in the air is to cross your arms over your head, grasp the left suspension lines with the right hand, and the right group with the left hand. (Be sure you don't grab the risers) Now a simultaneous pull with both hands will turn your body. Don't let go until you land or you'll turn back again.

Looking where you are going may also prevent you from removing the weather vane on some roof or keep you from doing a wire walking act on high tension wires. Avoid these exhibitions by carefully side-slipping your chute. Pull down on the risers on the side that you want to go toward. Slipping your chute will increase your rate of descent so plan to land short, or to one side, of the obstacle.

When nearing the ground prepare to land with your knees slightly bent and feet kept about six inches apart. Extend your arms over the head and hold the lift webs on each side; and relax. This is the time to make like a rag doll, never like a wooden soldier. The body should sink to the ground in a loose condition and be allowed to roll.

If your landing will be in trees the rules are different. The feet are kept tightly together and the arms are crossed over the face. If your tree landing is at night and you don't have a flashlight wait until you can see the ground before you try to get down.

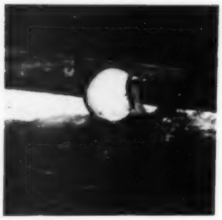
A tree landing eliminates the need to collapse your chute but if a ground landing is made the jumper is in danger of being dragged along the ground like a rag doll. The remedy is immediate deflation of the canopy after touchdown. This can be done by climbing up the risers *nearest the ground*, hand over hand, until the canopy skirt collapses. Upon reaching the canopy fall over it and unfasten the harness snaps.

Coming next month — the latest scoop on parachute water landings. Watch for it in your December Approach.

Dilbert Dunker training

makes emergencies

no strain



"He went over the side just aft of No. 2 elevator . . ."

OVER the catwalk into the drink to Davy Jones' house he goes! But he came back safe, thanks to Dilbert——Dunker that is.

This F2H pilot had made a normal carrier landing and was folding wings and taxiing, when he felt a severe swerve to port. The starboard brake failed to respond, so he tried 100 percent power on the port engine hoping to turn himself up the center of the deck and catch the barricade.

This was not effective and he went over the side just aft of No. 2 elevator hitting the water in an attitude a little past vertical. In describing his experience, the pilot stated, "The impact didn't seem too great compared to the Dilbert Dunker. I had approximately the same sensation that one gets in the Dunker and felt as though I was inverted. My oxygen selector was on but I do not remember if I breathed before I left the cockpit. I unfastened my safety belt and arched my back with both

Ejection training pays off

ALTHOUGH four airstarts were successful, the engine of the *Fury* failed to increase power when the throttle was moved from idle so the engine was secured. Passing through 10,000 feet the pilot elected to eject over a sparsely settled area as no suitable landing area was available.

The pilot stated, "Before ejection I checked my para-

arms over my head and pushed hard with both feet."

The pilot received only minor injury when he bruised his right shin against the canopy in clearing the cockpit, and was picked up by helicopter on reaching the surface. He, needless to say, is a strong believer in the Dunker. He commented:

"The Dilbert Dunker rides really paid high dividends for me. I did exactly what I had been taught to do automatically. I highly recommend that all pilots be given a ride in the Dilbert Dunker at six-month intervals whenever possible, and that all pilots who are normally required to wear oxygen masks during flight be required to wear mask and gloves during the drill. . . . The crash helmet and a tight shoulder harness and safety belt prevented any injury to me. I recommend to all pilots that they stay strapped in tight, with the oxygen mask on, and oxygen on 100 percent until the chocks are under the wheels."

Pilots who may have to evacuate aircraft under water will also be vitally concerned with two new discoveries made by VC-62.

This squadron has been developing a more realistic indoctrination in the Dilbert Dunker, using all items of modern flight equipment including diluter demand oxygen equipment and MK-IV exposure suit.

They found that breathing under water in an upright cockpit is similar to pressure breathing. Exhalation is slightly difficult because of the difference in pressure at the regulator and the mask. Pressure breathing is a far cry from what is considered normal breathing and for an uninitiated or untrained pilot it could easily result in panic. Such panic would undoubtedly cause him to cast off his life saving equipment.

When the regulator and mask are in the same horizontal plane, as in an overturning cockpit, breathing is approximately normal. When the cockpit is inverted the regulator is above the mask and inhalation becomes quite difficult. Positive inhalation action is required to draw the oxygen from the regulator.

The use of the Mark-IV exposure suit required that the feet be used in evacuating an overturned cockpit. This is directly contrary to present doctrine, but is required because of the buoyancy of the exposure suit which tends to trap the pilot in the cockpit.

The best technique is to wait for motion to cease, then unfasten the safety belt and radio cords, grasp the windshield with both hands and commence a flutter-kick motion with the feet, moving them back to the seat. Then leave the cockpit with a simultaneous pull by the arms and a push-out by the feet.

Once free of the cockpit, the buoyance of the exposure suit becomes an asset. It was recommended by VC-62 that this more complete Dilbert Dunker training be widely adopted. ●

chute and straps for tightness, tightened the chin strap of my helmet and made certain that my oxygen hose was fastened to my parachute to keep it from bashing me in the face. I then slowed the plane, positioned myself in the seat and pulled the face curtain in two steps, jettisoning the canopy with the first pull, then firing the seat by pulling the rest of the way.

"The ejection equipment worked perfectly. I released the curtain immediately after clearing the plane to find myself tumbling forward fairly rapidly. I waited a second or two to see if the tumbling would stop, then opened the lap belt and pushed with my feet to clear the seat. The seat broke free cleanly, and I continued to tumble forward. I tried to stop this but was unsuccessful, so I pulled the chute. It opened normally with a minimum opening shock at an estimated altitude of four to five thousand feet. The descent was uneventful. Contact with the ground was fairly easy and I had no injury."

The accident board concluded that through continuous and thorough briefings of emergency procedures this pilot was able to cope with his emergency in a very methodical fashion. A constant review of emergency procedures was recommended for all pilots in model aircraft being flown. ●

NOTES

from your flight surgeon

WHO GOES THERE?

The Airlines Pilots Association, in its "Technical Talk," poses an interesting question: Have you ever watched your copilot set the directional gyro? Then, have you watched him tune the radio, noticing very carefully the frequency he is selecting? You have?

While you were doing this, *who was watching outside?*

ALPA observes that there is a time and a place for doing everything, but it should be coordinated well enough for someone to be watching outside at all times.

AND HE WALKED AWAY

Seven miles up and down the mountains he walked—away from his PRC-17! He didn't know he had a radio in his seat pack raft, so he left it with his parachute where he landed.

Cases like this illustrate the importance of planning your survival as well as your flights. Know what equipment you have and plan how to make the best use of it. The particular missing item of information in this case was the fact that the PRC-17 transmitter-receiver had replaced the radar corner-reflector in the life raft.

The pilot had ejected from an F2H-2P and landed, without injury, near the top of a mountain. If he had known, or if he had checked to find out, what was supplied with his seat pack, he could have contacted rescue right from where he landed, and avoided the fatigue, danger and minor injuries of the long trek over steep, rocky and mountainous terrain before he was rescued by helicopter.

The PRC-17 radio is now readily available in the supply system and may easily be obtained by those activities requiring it. Is there one in your parachute seat pack?

DON'T FORGET THE PILOT

Flight planning in one sense actually starts 12 to 24 hours before takeoff. You, the pilot, must be repaired, fueled, and in as good operating condition as the aircraft. In particular, it's advisable to—

- Get enough to eat, but avoid gas-forming foods. (your flight surgeon can advise you on this) You know that alcohol doesn't mix with flying, and that smoking affects your vision and your blood's carbon monoxide concentration.
- Get enough sleep — and don't let the sun set on your anger if you're flying tonight because preoccupation doesn't mix well with flying, either. Nor does illness or self-medication improve your flight efficiency.
- Arrive for the flight in time to put on all your safety gear carefully, and go over the plane's check-off list—but don't forget the pilot's check-off list first:

Yes	No
Food—non-irritating	Self-medication
Rest	Troubles
Energy	Alcohol
Safety Equipment	Laxity
Health	Excessive Smoking

Make sure the pilot is as ready as the plane! ●

Go or no-go? "TPT Tells the Tale" . . .
For that story please turn the page.

Maintenance →

Monitoring of tailpipe temperatures is a continuing requirement for safe jet engine operation.

TPT tells the tale

THE importance of turbine temperature control is emphasized by failures occurring in jet engines and premature removals. Experience has shown that a definite relationship exists between excessive temperatures and defected engines.

Overtemperature causes the erosion of metal in both stationary and turbine vanes. Turbine nozzle vanes and stator blades are subject to bowing and warpage. In addition, sheet metal parts such as duct liners and tailpipes deform and droop; in some cases, parts oxidize because of high temperature.

As turbine blades begin to deform from exposure to excessive temperature, turbine efficiency falls off. The fuel control, whose automatic function is to maintain the selected RPM, supplies more fuel to make up for the loss in turbine efficiency. This causes an even greater overtemperature condition which in turn causes hot section parts to deteriorate more rapidly.

In one instance a turbine rub developed from blade stretching. It was determined that the engine had been operating at 24° C above the temperature range for ambient conditions prevailing, although the cockpit gage indicated temperatures to be within limits.

Another instance involved overtemperature of a J-33 engine in which the turbine blades straightened. The fuel control stop setting had been increased from 98.5% rpm to 100% rpm without measuring its effect on tailpipe temperature other than observing the cockpit gage. This method is not accurate for measuring or setting tailpipe temperatures according to the J-33 Handbook of Maintenance Instructions. It points out that an error of 1% rpm engine speed will produce an error of exhaust gas temperatures of approximately 20° C.

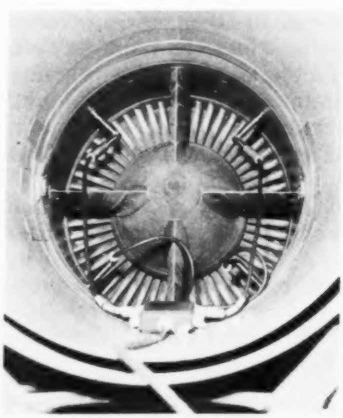
To preclude or lessen the possibility of this kind of damage to jet engines, pilots and ground personnel should strive to achieve normal starts, proper fuel regulation and avoid prolonged ground running when the aircraft is not headed into the wind. Personnel who operate in excess of recommended limits contribute to reduced engine reliability.

The monitoring of engine gas or tailpipe temperatures is a continuing requirement, the frequency of which should be within limits required for a particular engine or sooner if con-

ditions indicate. The use of functional thermocouple-circuit-testing equipment such as the Jetcal becomes necessary to test and troubleshoot an aircraft at the first indication of temperature problems and on periodic maintenance checks.

The basic design of the Jetcal according to NavAer 17-15A-501, the handbook of operating instructions, is to test the functioning of the thermocouple system by artificially heating the engine thermocouples in the tail cone to engine test temperature. With the thermocouples hot this temperature is registered on the tailpipe temperature indicator. At the same time thermocouples imbedded in the heater probes are picking up and registering this same temperature on the potentiometer of the Jetcal.

The thermocouple temperature registered on the tailpipe indicator should be within specified tolerance of the Jetcal reading. When the temperature difference exceeds allowances indicated in the applicable Handbook of Maintenance Instructions, maintenance personnel should troubleshoot the aircraft system to determine which part or parts are in error.



Heater probes relay true temperatures through thermocouples.

Calibrate the tachometer too.

A second and very important use of the Jetcal occurs when exhaust tail cone areas are adjusted, i.e. trimming, tabbing or adjusting automatic control positioned eyelids. These areas are adjusted by using the potentiometer of the Jetcal for temperature readings during the engine runup.

Normally, the readings from the engine thermocouple harness are accepted as correct. However, readings of the harness should be first compared to Jetcal readings of the heater probes. This very accurate check is made before engine turnup. After this check remove probes and turn up engines to 100% rpm. Using the Jetcal, the temperatures of the engine thermocouples is read on the potentiometer and used to adjust the controls on those which have automatic controls. Engines with fixed-area exhaust cones require shutting down of the engine, tabbing, either plus or minus, to meet requirements. Some engines may require cone-trimming to obtain proper nozzle area.

Jetcal equipment, model BH-112-J with accessories, is also used for checking exhaust gas temperature system resistance and tachometer calibration. (Earlier model Jetcals are not equipped to check system resistance and tachometer calibration.) The calibration of EGT and RPM indicating circuits follow engine replacement or EGT and/or RPM circuit component changes, periodic inspections (30-hour on FJ-3 aircraft) or after system disconnection.

The EGT test is made by installing the Jetcal thermocouple heater probes and adjusting the heat to 650° C. Comparison is then made of the cockpit indicator. If tolerance is exceeded, initiate trouble isolation procedure. To test tachometer calibration, install the Jetcal tachometer check circuit, start engine and check the calibration at 100% rpm. If the allowable tolerance is exceeded, replacement of the defective unit becomes necessary.

In summarizing; the actual turbine temperature is the factor which limits jet engine operation. Calibration of the observed temperature to actual turbine temperature permits jet engine operation within established safe limits and assurance that the turbine will be protected from over temperature. ●

Loose torque takes its toll.

From The Ground Up

Notes and Comments on Maintenance

TORQUE VALUE—A loosely torqued guide nut on the carburetor fuel feed valve of an F4U caused a power loss which resulted in a crash landing in a densely populated area. The pilot had two alternatives—to bailout or ride the aircraft down. He elected the latter because of the population density in the area and chose one of the very few open spots that was available.

On landing he brushed through the top five feet of some oak trees; stalled with wings level, 30 degrees flaps, gear up, just short of some railroad tracks; skidded over the tracks; hit and uprooted a 12-inch thick oak tree; skidded across a street onto the front lawn of a private residence from which the occupants were absent, and came to rest at the front porch inflicting minor damage to the porch railing. All circumstances considered, the pilot executed the emergency landing in an exemplary manner according to the accident board report.

Fire broke out in the cockpit and the pilot exited immediately. He suffered facial burns. The board reported that had he worn the oxygen mask as required by squadron doctrine, the burns would have reduced considerably in area. Local firemen who had been alerted of the impending crash extinguished the fire in short order.

It was determined by the accident board that a loosely torqued nut on the fuel feed valve permitted fuel to leak from the pressure side of the carburetor diaphragm to the upper chamber thereby preventing proper operation of the valve. Fuel starvation and engine failure resulted.

The board recommended promulgation of an appropriate bulletin which will require that the fuel feed valve guide nut be inspected by operating activities to ensure that it is properly torqued. It also recommended that pilots be rebriefed on the reasons and necessity for wearing complete safety equipment.

SHORT BOLT BOLTS—This caused the forced landing of an HRS-2. Maintenance personnel substituted a bolt which was $3/8$-inch short of the required length in connecting the throttle linkage to the bellcrank. This precluded correct installation of the elastic stop nut. The nut subsequently backed off in flight. A partial power loss was experienced and a forced landing resulted. Investigators attributed this accident to poor maintenance. Round or chamfered end bolts must extend at least the full round or chamfer through the fiber. Flat end bolts must extend at least $1/32$-inch through the fiber. In short—*don't bolt short.* ●

SUDDEN OIL LOSS—Too much oil in the system caused a recent in-flight fire. Oil expelled from the filler neck of an HO4S-3 ran down into the air intake area for engine cooling. The vaporized oil passed over the hot exhaust pipe and burst into flame. The copilot noticing the smoke and flames alerted the pilot who quickly landed the helicopter safely in a small cultivated field which was surrounded by tall trees. After securing the engine most of the flames died away. The small remaining fire was put out with a CO_2 extinguisher.

The engine was thoroughly inspected and no oil leaks were noted. It is believed that the engine oil pressure relief valve remained open slightly when the engine was shut down on the previous flight allowing oil to drain into the crankcase. The plane captain replenished the oil to normal level, thereby over-filling the oil system.

EVERYTHING OIL RIGHT? While executing a wave-off, the pilot of a TV-2 became blinded by smoke from the cockpit pressurization vents. He jettisoned the canopy to clear the cockpit of smoke and then executed a normal approach to a landing.

Inspection revealed the oil filler cap lying in the plenum chamber. The plane captain and the pilot both stated they had inspected the oil filler cap prior to the flight. The oil cap operated properly on postflight inspection.

READ 'EM and LIVE—The recent report of a fatal ordnance ground accident recalled the admonition of a veteran ordnanceman in checking out new replacements. To these newcomers, who often appeared somewhat puzzled over the number of precautions and instructions posted about the gunnery spaces, the old gunner would growl:

"D'ya see all those safety regulations and procedures? Well, remember one thing: every single one of those instructions was written because somebody got hurt doing that particular thing. Just picture each one of those safety precautions chiseled on a tombstone and you'll get the idea of why they're important.

"Read 'em and live by them—because if you don't, you won't be around long, and we'll be writing another instruction."

The particular accident in point is a grimly impressive example of what the gunner had in mind. An AO2, engaged in a routine task of boresighting the guns of a *Banshee,* was following prescribed procedure. He would make the necessary adjustments, check through the boresight tube and direct adjustment on the rear of the gun. Then he would remove the boresight tube, move to the starboard side of the plane and start the power unit. From there he would move to the port side of the plane and place one round of ammunition in the chamber; then he would take position at the port wing butt and give the man in the cockpit the thumbs-up to fire the round for check.

The sixth time this procedure was executed, the AO failed to remove the boresight tube from the gun. When the gun was fired, an explosion resulted which threw fragments from the gunbarrel in all directions. One piece of the shrapnel struck the AO, inflicting injuries which were immediately fatal.

Only one error in a procedure so routine that the mistake might seem unreasonable—but it happened.

How is your procedure? ●

Firing with boresight tube installed was fatal to an AO.

This P2V in-flight fire occurred when the starboard engine failed internally. After a successful forced landing, bearing material found in engine sumps indicated possibilities of oil starvation. Too late to save this engine but it's not too late to save others from this malady.

Seven Keys to Oil Plate

Often engine failure-caused accidents are written off as instances of pure "material failure or malfunction." Such engines are of course sent to O & R shops for disassembly and inspection reports (DIRs). These reports, which become available at a later date than the original AAR often provide much additional valuable design and operation data on the engine.

For instance, O & R finds that many of the so-called "material failures" actually have oil starvation as their underlying cause.

Although oil starvation in an aircraft engine may result from a number of causes, it can best be prevented by sound maintenance procedures. One of the most important of these is the *preoiling* procedure. The function of preoiling is to prevent a temporary condition of oil starvation in an engine caused by the draining of oil from its passages and cavities during periods of inactivity.

Therefore, preoiling becomes most imperative before operating newly-installed engines and engines that have been idle. The length of time an engine can remain idle before preoiling becomes necessary varies with the specific engine. It is worthy of note however, that the Handbook of Instructions for Wright R-1300, R-1820 and R-3350 engines requires preoiling whenever the engine is idle for a period of 48 hours. BuAer ltr AER-MA-3211/6 of 27 January 1955 extends this period to 72 hours because a turnup is required every third day of all idle engines. Preoiling also becomes necessary after oil changes, whenever the main pressure oil strainer is replaced, and after any operation that permits air to enter the oil inlet line (tank to pump).

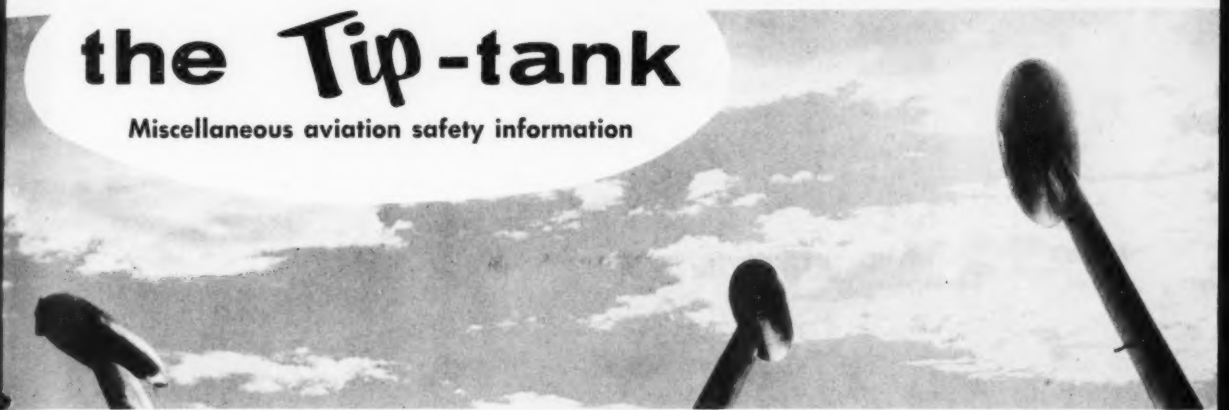
To benefit by the safest, longest life possible from an aircraft engine, maintenance personnel should know and apply the seven keys to oil plate. Presented here for review, they are:

1. Be sure that the oil tank is at least half-full, then remove the magnetic drain plugs from the front sump and the supercharger rear housing.
2. Remove one spark plug from each cylinder and the 1/4-inch pipe plug from the oil pump body.
3. Heat clean oil in the preoiler to 38-79° C or dilute the oil to correct proportions.
4. Before turning the crankshaft, insure ignition is OFF and carburetor is at IDLE CUT-OFF. Rotate with the starter until sufficient oil is expelled through the 1/4-inch hole to indicate that no air remains in the oil pump.
5. Force all air out of the preoiling pump and tubing.
6. After connecting the preoiling pump, preoil the engine until oil flows freely from the drain plugs.
7. Operate the engine as soon as possible after preoiling, being careful to stop the engine if the pressure does not register within the specified time limits.

Note: If pressure preoiling equipment is not available, the gravity supply to the rear pump inlet can be used. This procedure does not supply oil to the internal parts as quickly as the pressure method and requires long operation of the starter. This method should be used as an emergency alternative only. ●

the Tip-tank

Miscellaneous aviation safety information



WEATHER—EVERYBODY TALKS ABOUT IT, BUT . . .

A recent flight safety recommendation made by ComFairWingsLant points up the recurrent need for in-flight weather reports of weather reporting net lacks complete coverage.

For pilots, there are cited the requirements of OPNAV Instructions 3140.19 and 3140.20 (pilot requirements to make in-flight weather reports), and also the instructions contained in the Radio Facilities Charts which require that in-flight weather reports will be made by radio. (Reference to this problem was included in an article "Pireps, Please," published in the January/February issue of the *Naval Aviation Safety Bulletin.*)

The recommendation also noted the need for complete Sea-Air-Rescue information to be available to distressed aircraft. (A review of SAR facilities and aids will be included in a forthcoming article in the *Approach*)

PUBLICATION REQUESTS

Service Changes, Technical Notes, Technical Orders, Bureau Changes and other technical papers which may be mentioned in the *Approach* and other NASC publications from time to time can be obtained by addressing requests to the nearest of the following publications supply points:

Commanding Officer
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- Alameda, Calif.
- Jacksonville, Fla.
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700 Robbins Avenue
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Those ordering these publications are urged to use the publications and forms order blank, NavAer 140, which can be obtained from the nearest publications supply point or from the Naval Aviation Supply Depot, Philadelphia, Pa.

IDEAS WELCOME

Ideas and suggestion for long or short articles in the *Approach* are always welcomed. When such material is used, proper credit will be given. Units are also invited to forward examples of unusually effective posters and other aviation safety displays. Just address Director, Naval Aviation Safety Center, Attn: Literature Department, NAS Norfolk 11, Va.

STOP!

Each copy of the *Approach* is intended for at least 12 readers, including pilots, flight surgeons, aviation maintenance, and servicing and supporting personnel. Please pass this copy along.

Well Done!

Donald E. Dilley, 2ND LT USMC

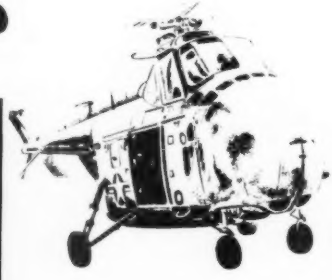
HMR—363

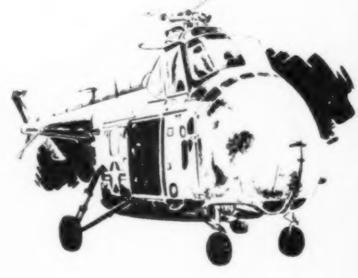
THE recent accomplishment of Marine 2ND LT Donald E. Dilley, who for the second time successfully landed a helicopter following engine failure, prompts appropriate recognition of a long and impressive list of similar saves, *many by first-tour pilots.*

Records indicate that since December 1953, there have been 98 no-damage, no-injury forced landings by the workhorse helicopters. One-fifth or 19 of these landings have been made by pilots with less than 900 hours total flying time, and nine were made by pilots with less than 500 flight hours. One of the more recent instances, for example, involved a pilot with less than 300 hours.

Examples of first-tour pilot ability, as exhibited by LT Dilley's power-off landing(s) without personal injury or damage to aircraft or property, are encouraging evidence of professional airmanship.

The *Approach* tips its hardhat to LT Dilley and his many colleagues whose positive approach to aviation safety further increases the regard for the multi-purpose choppers and their pilots.





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